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How globalization have affected income inequality in developing countries theoretical expectations versus empirical findings

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How globalization have affected income inequality in developing countries: theoretical expectations versus empirical findings

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EFI: Economic Freedom of the World Index

FDI: Foreign Direct Investment

GDP: Gross Domestic Product

IMF: International Monetary Fund

OECD: Organisation for Economic Co-operation and Development

PRTA: Preferential Regional Trade Agreement

WTO: World Trade Organization

Abstract

The objective of this paper is to analyse the effect of economic globalization on income distribution in a panel sample of 22 developing countries from 2000 to 2015. Using the Gini net income coefficient and the Gini market income coefficient from the Standardized World Income Inequality Database as measure of inequality, we find that international trade reduces income inequality in developing countries. Results are robust with and without China in the sample of developing country on one hand and with both Gini coefficient on the order hand. But comparing the results obtained for Gini net income with those obtained with Gini market income we find that the latter has a greater reduction on income inequality on developing countries. This result points out the role of institution of the countries in the redistribution policies.

1. Context and justification

In the last decades, the world economy has experienced a high economic growth level followed by an increase in inequality in several countries (Alderson and Nielsen 2002). According to Gozgor and Ranjan (2017), globalization and technological change are the main factors that could explain the rise of inequality in the world. Globalization for International Monetary Fund (IMF, 2002) *"refers to the increasing integration of economies around the world, particularly through trade and financial flows, the movement of people (labour) and knowledge (technology) across international borders and broader cultural, political and environmental dimensions"*. From this definition, one can disentangle globalization into several dimensions such as economic, cultural, political, and environment dimension of globalization. Economic globalization refers to international trade liberalization of good and services (free movement of goods and services), free movement of financial assets (flow of capital) and free movement of production factor especially labour (international migration or free movement of people and knowledge).

The Stolper-Samuelson theorem is one of the standard trade theories that describes the relationship between changes in output prices (or prices of goods) and changes in factor prices (or factors returns such as wages and rents). According to this theorem an increase in the price of a good will cause an increase in the price of the factor used intensively in that industry and a decrease in the price of the other factor. In this sense, trade liberalization which promote free movement of goods and services across border can affect income distribution through the change in relative price of goods and services. The premises of standard trade theory are that, trade occurs in final goods, production factors (capital and labour) are mobile within a country and immobile across countries, countries have a similar production technology. The only difference between countries allows by this model is the differential endowment in factors of production. However, these assumptions are inconsistent to describe the real world[1]. Relaxing these assumptions, in order to address the question of globalization and income distribution, allows several extensions of this theory. Among these extensions we have the **model of firm heterogeneity within industry**, the **model of workers heterogeneity beyond the**

[1] Nowadays, trade not always occurs only in final goods. There is an important trade on intermediate goods (Feenstra and Hanson 1996, 1997, 1999, 2003 cite by Goldberg and Pavcnik 2007); substantial increase in international capital flows (Goldberg and Pavcnik (2007) and technology diffusion from advanced countries to less developed countries via trade (Lee & Vivarelli, 2004, 2006b) that the standard model does not take into account.

classification into two groups of low-skilled and high skilled individuals, the **model of labour market frictions** (unemployment, wage bargaining and costly mobility).

In the economic literature, the relationship between globalization and income inequality[2] is a matter of controversy. Some researchers found a **positive relationship** between globalization and inequality (Carter 2007, Dreher and Gaston 2008, Meschi and Vivarelli 2008, Bergh and Nilsson 2010, Ahmad 2017, Reineckea and Schmerera 2018, Auguste 2018) while others found **no direct effect** of globalization on income inequality (Mahler 2004, Jaumotte et al. 2013, Goldberg and Pavcnik 2007, 2016, Helpman 2016) or even **negative relationship** between globalization and inequality (Scully 2002, Clark and Robert 2008, Cerdeiro and Komaromi 2017). The main difference in these findings is that globalization affects countries differently according to their level of development (developed or developing countries).

Over the past four decades, developing countries have implemented large-scale trade liberalizations and became integrated into the global trade system, now accounting for over 40 percent of the members of World Trade Organization (WTO 2016). We can also, notify an increase in Preferential Regional Trade Agreement (PRTA) in the world. Regarding the integration of developing countries into the world, this research focus on how globalization has affected income inequality in these countries. The general objective is to analyse the effect of economic globalization on income distribution in developing countries. The specific objectives are to provide a literature review (theoretical and empirical finding) related to the mechanisms through which globalization affect income distribution and to estimate the effect of international trade on income distribution in developing countries. To reach the second objective of this research, we used an unbalanced panel data for 22 developing countries from 2000 to 2015.

The interest of this research is that a better understanding of the relationship between globalization and income distribution in developing countries can help to take an advantage of globalization by implementing an appropriate policy in order to reduce income inequality and to promoted sustainable development. Also, this research will present a new empirical result.

The remaining of this paper is organized as follows: section 2 presents the literature review on globalization and income inequality, section 3 focus on method and data, section 4 presents and discusses the results (empirical analysis), and section 5 concludes the study.

[2] In this study we will use concepts of income distribution and income inequality without making any difference.

2. Literature review

We divide this section into three sub-sections. The first sub-section (2.1) clarifies the concepts, the second sub-section (2.2) discusses the theoretical base of relationship between globalization and income distribution and the third sub-section (2.3) focuses on empirical finding.

2.1- Clarification of concepts

Two main concepts are related to our topic (globalization and income inequality) and are clarified in this part.

- **Globalization**

It is a concept that has been defined variously over the years, with some connotations referring to progress, development and stability, integration and cooperation, and others referring to regression, colonialism, and destabilization (Al-Rodhan and Stoudmann, 2006).

Ritchie (1996), defines *"globalization as the process of corporations moving their money, factories and products around the planet at ever more rapid rates of speed in search of cheaper labour and raw materials and governments willing to ignore or abandon consumer, labour and environmental protection laws. As an ideology, it is largely unfettered by ethical or moral considerations"*. According to the International Monetary Fund (IMF, 1997), *"Globalization refers to the growing economic interdependence of countries worldwide through the increasing volume and variety of cross-border transactions in goods and services and of international capital flows, and also through the more rapid and widespread diffusion of technology."* Globalization also *"refers to the increasing integration of economies around the world, particularly through trade and financial flows. The term sometimes also refers to the movement of people (labour) and knowledge (technology) across international borders. There are also broader cultural, political and environmental dimensions of globalization"* (IMF, 2002). For Al-Rodhan and Stoudmann (2006), *"Globalization is a process that encompasses the causes, course, and consequences of transnational and transcultural integration of human and non-human activities"*.

Various definitions of globalization have been provided over time, but the idea remains the same. These definitions allow us to disentangle globalization into several dimensions such as economic globalization, cultural globalization, political globalization and environment globalization. Regarding the IMF (2002) definition, for us economic globalization resumes

international trade liberalization (free movement of goods and services), free movement of financial assets and free movement of production factor (people / knowledge) around the world.

- **Income inequality or income distribution**

According to McKay (2002), *"inequality is typically viewed as different people having different degrees of something, often considered in terms of income or consumption but equally applicable to other dimensions of living standards that show a continuous pattern of variation, such as the level of education or the degree of malnutrition".* So, income inequality refers to differences in income of people within the same category.

There are several indicators to measure income inequality. The simplest way to measure income inequality is to rank people from the poorest to the richest, then report the proportions of income (or expenditure) held by quintal groups (1^{st}, 10^{th}, 50^{th}, 90^{th} percentile for example) and finally compare how much each quintal group has. Another simple measure of inequality is to compute the standard deviation of income (or expenditure). But in the literature, the most popular measure of inequality used is a Gini coefficient which allows direct comparison of two populations' income distribution, regardless of their sizes. The Gini index "*measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution. It measures the area between the Lorenz curve and the hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line" (OECD, glossary of statistical terms)*. In terms of percentage, the Gini index goes from 0 (perfect equality) to 100 (perfect inequality). The main criticism about this measure is that it cannot be decomposed to show the sources of inequality (Report of World Bank, 2005, chap 6). Also, it does not respond in the same way to income transfers between people in opposite tails of the income distribution as it does to transfers in the middle of the distribution. Furthermore, very different income distributions can present the same Gini coefficient.

Another measure is Atkinson's inequality measure (or Atkinson's index) which is a welfare-based measure of inequality. It presents the percentage of total income that a given society would have to forego in order to have more equal shares of income between its citizens. This measure depends on the degree of society aversion to inequality (a theoretical parameter decided by the researcher), where a higher value entails greater social utility or willingness by individuals to accept smaller incomes in exchange for a more equal distribution. An important

feature of the Atkinson index is that it can be decomposed into within and between-group inequality (UN/DESA, 2015).

The Theil's T and Theil's L measures allow to decompose inequality into the part that is due to inequality within areas (e.g. urban, rural) and the part that is due to differences between areas (e.g. the rural-urban income gap). Both measures are based on computing for everyone the ratio of their income share to their population share.

2.2- Theoretical bases: international trade versus income distribution

In this part we present the theories of implications of trade liberalization on income distribution according to the standard model of trade (2.2.1), the new trade theory (2.2.2), and the extensions of the traditional trade theories (2.2.3).

2.2.1- Standard models of trade

Here we present the model of Heckscher-Ohlin and the model of immobile factor. We also, present the new trade theory of Krugman.

- **Heckscher-Ohlin model (or factor proportions model)**

One of the perfect competitive general equilibrium models, the Heckscher-Ohlin model analyses interactions across factors of production markets, goods markets, and national markets simultaneously. It is a two-by-two-by-two model, meaning two goods, two factors of production (Labour and capital), and two countries (home and foreign). The model assumes *"(i) perfect competition in all markets meaning producer and consumer are both price taker; (ii) labour and capital*[3] *are used in the production of two final goods; (iii) capital and labour are mobile within country and immobile across countries; (iv) the only differences between countries are the variations in the relative endowments of factors of production*"(Krugman, Obstfeld, Melitz, ninth edition, chapter 5).

According to the **Heckscher-Ohlin model**, *"countries will export (import) goods that use intensively the factors of production that are relatively abundant (scarce)"*. In others words, countries that are relatively abundant in capital will export the goods intensive in capital (abundant factor) and import the goods intensive in labour (scarce factor) while countries that are relatively abundant in labour will export the goods intensive in labour (abundant factor) and

[3]Capital refers to the physical machines and equipment that are used in production. Thus, machine tools, conveyers, trucks, forklifts, computers, office buildings, office supplies, and much more are considered capital.

import the goods intensive in capital (scarce factor). From this model derived the theorem of **Stolper-Samuelson**[4] which describes the relationship between changes in output prices (or prices of final goods) and changes in price of factors of production. The Stolper-Samuelson theorem predicts that *"an increase in the price of a good due to the openness will cause an increase in the price of the factor used intensively and a decrease in the price of the other factor"*. To illustrate, suppose we are in a country with two factors of production (labour and capital), and this country is abundant in labour. So, capital generates a rent for the factor owners and labour generates a wage for the workers. Because the country is abundant in labour, according to Heckscher-Ohlin theorem, it will export labour intensive goods. When the country moves to free trade and the price of the good intensive in labour rises this will lead to increase the wage of workers through an increase in labour demand and a decrease in the rent of capital owners (because of the perfect substitutability assumption between capital and labour). ***To summarize, according to the theorem of Stolper-Samuelson, international trade affects wages only through changes in the relative price of final goods.***

- **Immobile factor model**

The model of immobile factor as the model of Heckscher-Ohlin, is a two-country, two-good, two factors of production and perfectly competitive general equilibrium model. The only thing that changes in this model compared to the previous model is the assumption that the production factor (labour for example) cannot move across industries in the very short run and become productive in another industry. According to this model, when countries move to free trade, workers in the export industry will benefit, while workers in the import competing industry will lose. According to this model, ***international trade affects income because of the immobility factors of production across industries.***

2.2.2- The new trade theory (model of Krugman) and income distribution

The model of Krugman is the model of two countries with identical technology and one factor of production (labour). The model explains why countries trade similar goods and services (intra industry trade). Intra industry trade occurs because of consumers preference characterized by the love-of variety.

[4] Sometime called also Heckscher-Ohlin-Samuelson theorem. But in this paper to simplify, we will refer to Stolper-Samuelson theorem.

The difference of this model with the standard trade theory model is: on the one hand, the assumption of increase return to scale (bigger firm can spread its fixed costs over a larger volume of output, reducing its average fixe costs, and thereby charge lower prices which will displace its competitors[5]) that is consider instead of constant return to scale. On the other hand, the model allows for transportation costs.

According to this model, a country will specialize in the production of goods for which it has greater demand. Under free trade, workers in a bigger country will have higher real wages because the country produces a larger number of varieties. ***Following the model of Krugman, trade affects wage through the demand of products.***

2.2.3- Extensions of traditional trade theories

Many other extensions of the standard model of trade related on the mechanism by which globalization can generate income inequality have been developed more recently. According to Pavcnik (2017) there are at least four channels by which international trade influences income distribution such as industry affiliation, firm affiliation, location of residence and individual demographic characteristics (age and education). Previously in their study, Goldberg and Pavcnik (2007) have identified that globalization affects individual through *"change in their labour income, change in relative prices and hence consumption, household production decisions, transitional unemployment, changes in industry wages, uncertainty and labour market standards".*

In the paper wrote by Helpman (2016), firm heterogeneity within industries, worker heterogeneity beyond the classification into two groups of low-skilled and highs-killed individuals, and labour market frictions such as unemployment, wage bargaining and costly mobility are the main mechanisms that can explain income inequality. In this part of our literature review, we summarize these channels of Helpman.

- **Firm Heterogeneity**

In terms of productivity and size, within industry, firms are heterogeneous (some firms can export their production while others cannot). Exporters differ systematically from non-exporters, with exporters being larger and more productive. Melitz (2003 cite by Helpman

[5] For more detail see Bhattacharjea (2008)

2016) provides the canonical model which is consistent with a firm heterogeneity approach. He assumes that:

- *"Labour is homogeneous, and entrepreneurs pay an upfront "entry" cost to acquire a manufacturing technology. The entry cost may consist of R&D or the cost of forming a business enterprise;*
- *The productivity of the manufacturing technology becomes known only after the entry cost is sunk and;*
- *Only the distribution of productivity is known when the entry decision is made"* (Helpman, 2016).

Staying in business entails bearing a fixed operating cost in every period. But not all entrants into an industry stay. Only firms with a high enough productivity level are profitable and can export. For this reason, one can identify three types of firms: The more productive enterprises which can export, less productive firms which serve only the domestic market and the low productivity firms that have difficulties to face the costs close. In this model all workers are paid the same wage, independently of whether they are employed by high or low-productivity firms, by exporters or by non-exporters so that international trade impacts the wage level but not wage inequality. ***The profitable firms' workers tend to have higher wages than others***.

- **Worker heterogeneity**

Because, many workers are matched with a single manager or a single firm, in order to describe inequality (especially wage inequality) it is important to identify worker characteristic (ability), and managers' characteristics (managerial ability) or firms' characteristics (technological sophistication). The worker heterogeneity model uses a stronger notion of complementarity (a marginal increase in the characteristic of one party raises the marginal value of the other party's characteristic proportionately more than the value of the match).

To illustrate this, Helpman (2016), considers four different types of abilities (A, B, C, and D). Measured in appropriate units the abilities A and B (with ability B greater than A) design two different workers and the abilities C and D (with ability C greater than D) characterize two types of firms. He first supposes that workers with ability levels between **A** and **B**, (e.g., years of schooling) are matched with firms whose technological sophistication lies between **C** and **D**. Then workers with higher ability are matched with more-sophisticated firms and vice versa. Workers with ability **A** are matched with firms whose technological sophistication is **C** while

workers with ability **B** are matched with firms whose technological sophistication is **D**. In this event more-able workers are paid higher wages, and the rate at which wages rise with ability depends on how strong the complementarity between worker ability and firm sophistication is in the productivity function. The rate of wage increase determines in turn wage inequality in this ability range. Second, he supposes that due to a change in the economic environment (e.g., a change in relative product prices), the workers with abilities **A** to **B** match with more-sophisticated firms, so that every worker is now employed by a more-sophisticated firm. Under the circumstances the relative wage gap between any pair of workers with different ability levels is now larger than it was before. For this reason, wage inequality is now higher than it was before. ***As a conclusion, globalization affects income distribution through the match of workers (according to their abilities) with firms.***

- **Labour market friction**

Labour market friction is one of the many channels through which globalization can affect inequality. Some labour market frictions are due to government regulations (minimum wages or firing for example), other are ingrained in a functioning economy (the cost of finding a job or the cost of switching jobs). In many countries labour unions cannot be neglect. It plays a major role in wage setting within firms, within industries, or at the country level.

In recent studies on relationship between international trade and wages, Mortensen and Pissarides (1994, cite by Helpman 2016) and Diamond (1982 a, b, cite by Helpman 2016) the frictions on labour markets due to job search and matching on the labour markets are introduced. Indeed, those are key macroeconomic determinants of unemployment. In this framework firms post vacancies and unemployed workers search for jobs. Workers are matched with vacancies, but only some workers succeed in finding a job and only some vacancies are successfully filled. The degree of success of the matching process depends on characteristics of the labour market; in more-efficient markets more matches are realized and some markets favour workers more. Matched firms and workers engage in wage bargaining. Failure to reach an agreement is costly to the workers and the firms, because it raises the number of unfilled vacancies for firms and the number of unemployed for workers. As a result, every party has an incentive to reach an agreement. Understandably, wage bargaining takes place in the shadow of these costs, which consequently impacts the wage agreement. International trade modifies the choices available to firms and the employment opportunities available to workers. Through changes in these options trade modifies wages and employment.

2.3- Empirical findings

The empirical findings related to the relationship between globalization and income distribution are divided into two sub-groups. We first, present the results which ignore the source of income (2.3.1) and second we present some results which focus on the source of income especially wage income (2.3.2).

2.3.1- Globalization and income distribution (independent of source of income)

The empirical literature of globalization and income distribution remains a contentious issue among scholar. In this case, there are three (03) categories of findings: the first category is the authors who found a positive relationship between globalization and income inequality (deeper globalization increase income inequality), the second group of authors found a negative relationship between globalization and income inequality (deeper globalization reduce income inequality) and the third group consider that globalization has no significant and direct effect on income inequality. Recall that globalization is a concept with multiple dimensions (economic, political, cultural and environmental dimension). We want to discuss here about the economic globalization which considers international trade, Foreign Direct Investment (FDI) and International migration. Among the whole findings, we have the followings studies:

Scully (2002) analyses the relationship between economic freedom, growth and inequality for first a pooled sample of 26 countries (advanced countries and some newly industrializing Asian nations), and second for 66 countries (developed and developing countries), respectively over the 1975-1980 period and 1985-1990 period. He finds evidence that economic freedom reduces income inequality (i.e. lowers the Gini coefficient). **Carter (2007)**, estimates a quadratic relationship between economic freedom and income inequality by using panel setting run from 1980 to 2000 for 39 countries most of which are Organisation for Economic Co-operation and Development (OECD) members, and in contrast to the result of Scully done in 2002, finds that an increase in economic freedom raises income inequality.

Dreher and Gaston (2008) focus on the question "has globalization increase income inequality?" and use a panel for 123 countries from 1970 to 2000. Two different inequality measures[6] have been considered, the first one is the industrial wage inequality and the second one is the household income inequality. Globalization is measured by KOF Index of

[6] The authors differentiated income from earning because income includes the receipt of income from all sources, and therefore including capital ownership and government transfers while earning is a part of income.

globalization (which is a composition of three indexes: economic globalisation, social globalisation and political globalisation)[7]. Their results suggest that globalization increase inequality. The results are particularly stark for OECD countries. In less developed countries, they find no significant impact of economic globalization on inequality (both income and earnings). Based on these results it seems that the effect of economic globalization on income inequality depends on the countries development level. **Bergh and Nilsson (2010)** use an unbalanced panel covering around 80 countries (developed and developing countries) from 1970 to 2005, in order to solve the question: "Do liberalization and globalization increase income inequality?" To quantify globalization and liberalization they used the KOF Index of Globalization, developed and first used by Dreher (2006, cite by Bergh and Nilsson 2010), and Economic Freedom of the World Index (EFI)[8] of Gwartney et al. (2008, cite by Bergh and Nilsson 2010). The Gini coefficients of household net income has served to measure within country income inequality. Their results suggest that less regulation of credit markets, of labour and of business increase income inequality taking all countries together. Dividing the sample according to development levels the results suggest that in relatively rich countries, economic freedom (size of government, freedom to trade internationally and regulation of credit, labour, and business) increase income inequality, while economic freedom has no significant effect on income inequality in middle- and low-income countries. The results of Bergh and Nilsson (2010) confirm that the effect of globalization on income inequality depends on the country development level.

Meschi and Vivarelli (2008), estimate the impact of trade on within-country income inequality focusing on a sample of 65 developing countries over the 1980–99 period through a dynamic specification. Their find that trade with high-income countries worsen income distribution in developing countries, through both imports and exports. But this result is observed only for middle-income countries. Previously, **Conte and Vivarelli (2007)** examined the impact of technological transfer on the employment of skilled and unskilled labour in a sample of low- and middle- income countries and find that imported skill-biased technological change was one of the determinants of the increase in the relative demand for skilled workers within developing countries in the 1980s. So, the main explanation gives to this result found by Meschi and Vivarelli (2008) is that the middle-income countries are upgrading in technology than low-income countries and skill biased nature of new technologies impact income. **Jaumotte et al.**

[7] See more detail about KOF index of globalization in appendix 1.

[8] See more detail about Economic Freedom of World index in appendix 1

(2013) study the effects of technological change, international trade and financial globalization on income inequality in a panel of 51 countries (20 developed and 31 developing) from 1981 to 2003. International trade measured by first average tariff rate, and second by the ratio of the sum of import and export relative to Gross Domestic Product (GDP) of each country considered reduces income inequality (measure by Gini coefficient) whereas financial globalization especially FDI increases income inequality. Technology also increases income inequality but in greater extent than the increase of globalization especially FDI. Technology and FDI increase income inequality because they need skilled labour, and this leads to the gap observed in income distribution (skilled people benefit more than unskilled). But in this study, there is no information about the interaction of international trade and financial globalization effect on income inequality.

Mahler (2004) studies the impact of economic globalization and domestic politic factors on income inequality in developed countries: a cross-national study using 59 household-level data from 1970 to 2000. He studies three major modes of international integration (that correspond to economic globalization in this case) which are trade (measured by the share in GDP of imports from Least Developed Countries), Foreign Direct Investment (measured by Outbound investment flows expressed as a proportion of GDP), and international financial flows (measured by 14-point scale of financial openness developed by Quinn and Inclán in 1997). He also uses four domestic political variables such as the partisan balance of national cabinets, electoral turnout, union density, and the centralization of wage-setting institutions, and income distribution or redistribution measured by three separate variables (earning inequality, fiscal redistribution and disposable income) are included in the model. The results *"finds a little evidence of a systematic relationship between economic globalization and the distribution of household earnings, fiscal redistribution by the public sector, or the distribution of disposable income. but reasonably strong positive relationships between several domestic political variables and an egalitarian distribution of income and/or extensive state redistribution"*. In fact, domestic political factors play an important role in determining distributive outcomes. **Ahmad (2017)** in its study on the effect of economic freedom and democracy on income inequality for 115 countries (including developed and developing countries), finds that more economic freedom has increase income inequality, but this inequality is attenuated in the presence of a democracy regime. The same results are found by **Reineckea and Schmerera (2018)**. With a sample of 141 countries including both developed and emerging economies, they find that trade reduces inequality in countries with high institutional standards (low level

of corruption) but increases inequality in countries with low levels of institutional quality. This is because democratic government has the capacity to sustain and extend the positive benefits of these market reforms across a wider segment of population via various egalitarian redistributive measures such as welfare-augmenting transfers, increased child benefits and healthcare, better access education, and other income-equalizing measures.

Gozgor and Ranjan (2017) in their study link globalization, inequality and redistribution in theory and in evidence. The study concerns 140 countries (developed and developing countries) with data from 1970 to 2012. Using a panel specification, the authors use two alternative measure of globalization: trade openness (measured as the sum of exports and imports relative to GDP) and KOF index of globalisation. Income inequality is captured in this study by the Gini coefficient market income whereas redistribution is captured by the difference between the pre-tax/transfer Gini coefficient income (called market income inequality) and post-tax/transfer Gini coefficient of income (called net income inequality). Controlling for several variables the results suggest that all measure of globalization increase income inequality but the result with trade openness is not statistically significant. Moreover, greater globalization is associated with higher redistribution in the sample of countries observed. Checking if the results differ according to the level of development, they find that primarily the positive association between globalization and income inequality hold for both level of development but the positive association between globalization and redistribution hold only for high-income countries and OECD countries. The main explanation is that in high-income countries, there is more response on increase on inequality due to globalization through redistributive policies than in low-income countries. In the same direction, focusing only on evidence for 23 OECD countries from 1990 to 2009, **August (2018)** studies the relationship between "income inequality, globalization, and the welfare State". He finds that economic globalization (measured by international trade, FDI inflows and international migration) does not affect pre-tax/transfer income inequality and post-tax/transfer income inequality in the same way but the welfare state may reduce income inequality in these countries.

In this part, we have seen that economic globalization has a various effect on income inequality regarding the level of development. Technology has a greater effect on increase in income inequality in middle- and high-income countries than globalization. Also, the political factors play an important role in attenuating the increase of inequality due to globalization and high-income countries response more to the rise in income inequality due to globalization by redistributive policies than other countries. But these results ignore in their analysis the source

of income. The use of composite index also can underestimate or overestimate the effect of globalization on income inequality in the sense that it is an aggregate measure. Another remark is that we cannot precisely know whether it is international trade that worsen / enhance income inequality or whether it is financial globalization. So, in the second part of this literature review we will focus on the source of income (here wage income) in order to disentangle the channel by which globalization can affect wage.

2.3.2- Globalization and income distribution (focus on wage inequality)

The empirical literature of the effect of globalization on wage inequality can be broken into several schools of thought as mentioned above. In this study we consider three schools. The first that we want to present follows the standard Heckscher-Ohlin-Stolper Samuelson trade model and the worker heterogeneity model, which highlights the role of international trade in reducing the income gap between skilled and unskilled workers. The second class of thought focuses on the detrimental effects of globalization on wage through firm heterogeneity channel and the third school of thought points out the relationship between globalization and wage through labour market friction.

The main findings and methods of some papers of those three schools are summarized in the table below.

Table 1: Brief review on globalization and wage inequality

Studies	Measure of wage inequality	Measure of trade openness	Method of estimation and sources of data	Main results
Heckscher-Ohlin-Stolper Samuelson trade model and the worker heterogeneity model				
Han et al. (2012) "*Globalization and wage inequality: Evidence from urban China*"	Log level of real labour earnings by 10^{th}, 50^{th}, and 90^{th} percentile.	Period dummy variable. 1 for years after southern tour (after 1992), and 1 for years after WTO accession (after 2001).	Quantile regression and Difference-in difference strategy (before and after trade shock: WTO accession and Southern Tour). **Chinese Urban Household Survey data from 1988 to 2008 micro-level data**	First, China's WTO accession contributed to rise within-region wage inequality in exposed region. Observed wage skills has substantially rise wage inequality after WTO accession. In contrast unobserved skills have contributed considerably to rise wage inequality after the Southern Tour. Second, trade liberalization rises within-region inequality by raising the returns to education in more exposed regions.
Xu and Ouyang (2017) *"Tariffs, relative prices and wage inequality: Evidence from China"*	Percentage change in value-added prices of skilled labour, unskilled labour and capital	tariff percentage change for sector and level changes of effective tariff rates	Longitudinal model **28 manufacturing industries data in China over the period 2002 to 2011**	Tariff reductions have reduced the relative prices of unskilled-labour products and then lowered the relative return to unskilled labour and have led to widened wage inequality.
Firm heterogeneity				
Juhn and al (2013) *"Trade Liberalization and Gender Inequality"*	log change in the ratio of female to male outcomes for employment and wage bill for the firm	Import and Export tariffs: sectoral change in US and Mexican tariffs from 1991 to 2000	Balanced panel of 938 firms. **firm-level information & Mexican National Survey of Employment, Wages, Technology and Training (1992 and 2001)**	No evidence that import and export tariff reductions improved relative outcomes of women in white-collar occupations. But, reductions in export tariffs are associated with larger increases in the growth of female employment and wage bill shares for blue-collar workers.

Ge and al. (2019) **"***Access to imported intermediates and intra-firm wage inequality"*	**Inter-firm wage inequality measure**: The logarithms of the average wage in firm **Intra-firm wage gap measure**: the ratio of the highest wage to the lowest wage within firm	Probability to import intermediate inputs	OLS, Ologit method. Probit analysis has been used to find the probability of importing intermediate inputs by firm. **Chinese firm-level data from the World Bank Investment Climate Survey**.	Firms that import intermediate inputs exhibit greater intra-firm wage dispersion than non-importers. Importers firms are more likely to invest in research and development (R&D) and provide employee training, as well as to make greater use of computers and Internet than non-importers.
Labour market friction				
Krishna and al. (2012) *"Trade, Labour Market Frictions, and Residual Wage Inequality across Worker Groups"*	Standard deviation of residual wage	Effective rate of protection and final goods tariffs.	Worker level information; industry level information on trade protection and firms level data on export **Brazil from 1990 to 1998**	following trade liberalization high education workers experience greater increases in wage dispersion relative to low education workers. According to a decline in effective rate of protection, college educated workers at exporting firms experience an increase in wages relative to college educated workers at non-exporting firms.
Pavcnik (2017) *"The Impact of Trade on Inequality in Developing Countries"*	Perceptions of trade's benefits for wages and job creation across countries.	Liberalization under WTO	Micro survey for more than 40 countries[9] from formal manufacturing. **2002 and 2014 comparison**	Perception of trade effect one jobs creation and wage vary across country at different level of development. Individual in lower-income countries tend to view international trade as more beneficial for job creation and wages than those in higher-income countries. But But between 2002 and 2014, the share of individuals perceiving trade as good in an average country drop.

Source: Author from different paper read

[9] Low- middle- and high-income countries with incomes per capita ranging from $1,000 to $50,000 (PPP, constant 2011$).

3. Methods and data

In this part we present how the research objective is achieved. In order words we choose the variables of our empirical model (3.1) and present the model specification (3.2). Recall that the general objective of this research is to analyse the effect of economic globalization on income inequality in developing countries. The data used in this research comes from various surveys and cover the period 2000-2015 for a sample of 22 developing countries[10].

3.1- Choice of variables

In general, the income of a household comes from different sources (wage, dividend, profit, public transfer etc). So, the relationship between globalization and income inequality needs to consider these facts. Which implies to deal with individual survey (household level or firm level). But, in this research, we only focus on income without making any difference between sources of income. The model aims to estimate the effect of economic globalization on income inequality. It follows the methodology of Bergh and Nilsson (2010) but three main differences can be notified: first, we focus only on developing countries (classification of world bank), second, economic globalization is measured differently (we do not take a composite index here as EFI and KOF index of globalization), and third, we control for technology in our model.

- **Dependant variable (income inequality measure)**

There are many ways to measure income inequality. The simplest way is to compare the share of income held by quintal groups or to compute the standard deviation of income. But the most common measure used in literature is the Gini coefficient computed at individual level or household level. There are different types of Gini coefficient. Among which we have: the Gini coefficient for market income (also called Gini coefficient of gross income or pre-tax/transfer income), the Gini coefficient for net income (also called Gini coefficient of disposable income or post-tax/transfer income), the Gini coefficient of consumption expenditure etc. Although this coefficient has received a criticism in literature, the principal measure of inequality uses in this research is Gini coefficient for net income. We focus on Gini coefficient as measure of inequality because for a large number of developing countries, the others reliable measures of inequality are not available over long period. We will estimate again the model using the Gini coefficient of market income as a robustness check and check of role of transfer. The Gini

[10] For more detail about the sample of developing countries see appendix 2.

coefficient market income and Gini coefficient household disposable income are provided by Standardized World Income Inequality Database (SWIID) version 8.2.

- **Independent variables**

Economic globalization focus especially on international trade is our variable of interest in this model. Indeed, economic globalization refers to free movement of goods and services (international trade), free movement of financial assets (international finance), and free movement of people (international migration). In the literature and specifically in the study of Bergh and Nilsson (2010), KOF index of globalization and EFI are the measure of globalization. But these measures are composite indexes that gather many variables. For this reason, and also because we are focusing only on international trade, we use another measure.

- **International trade**:

There are different categories of measure of international trade. Some of them are "de facto" or "openness in practice" variables and other are "de jure" or "openness in policy" variables[11]. In our model, international trade is measure as the share of export to GDP (which is the "openness in practice" variable)**.** According to the HO theorem because developing countries are intensive in labour, when export increases, we should expect a reduce on income inequality across workers. Also, increase of international export of country involved increase quality of production and require skill labour and in this context, we should expect that an increase in export increase income inequality. Total export in percentage of GDP comes from the World Development Indicators (WDI) of world Bank last updated on 04 April 2020.

- **Control variables**

To consider other factors that could explain inequality, we introduce in our model some control variables. So, we include the following variables: **(i) some variables reflecting the degree of development of the country.** One of them is GDP per capita. To be able to capture Kuznets effect[12] we introduce the square of GDP. Another variable capturing the development of the country is tertiary school enrolment. More specific this variable control for human capital accumulation as some empirical found that more people are educated, involved a reduction of income inequality due to globalization. **(ii)** a **variable which considers the fact that income**

[11] For more detail confer United Nation (2010) virtual institute teaching material on trade and poverty

[12] so-called inverted U hypothesis meaning that inequality increase in early stage of development and decline after country reaches a certain level of development.

inequality can be geographical concentrated: the share of people living in rural area (in percentage of total population). **(iii)** some **variables to control the extension of theory**: as predicted by trade theories, labour market friction affects income inequality as well as technology. In this sense we introduce in our model total unemployment in percentage of labour market force (we expect that higher unemployment rate increase income inequality), ICT[13] goods exports in percentage of total goods exports, ICT service exports in percentage of service exports (we expect that more country are upgrading in technology more income inequality increase).

GDP per capita, total unemployment in percentage of labour force and rural population in percentage of total population, tertiary school enrolment in percentage of total enrolment, ICT export goods in percentage of total goods exports and ICT export services in percentage of total services exports are collected from the World Development Indicators (WDI) of world Bank last updated on 04 April 2020.

3.2- Model specification and tool of estimation

- **Model specification**

In order to know if we should treat individual of our sample as the same or as differently, we run some specification tests, such as: Likelihood Ratio test, Breusch Pagan test and Hausman specification test. The Likelihood ratio test and Hausman test confirm a fixe effect specification while the Breusch Pagan test suggest the presence of random effect specification (appendix 3). So, the general form of empirical model specified is given by the following equation:

$$\begin{aligned} inq_{it} = \alpha + \beta_1 trade_{it} + \beta_2 GDP\_per\_capita_{it} + \beta_3 GDP\_per\_capita_{it}^2 \\ + \beta_4 tert\_scho\_enrol_{it} + \beta_5 rur\_pop_{it} + \beta_6 ICT\_exp\_go_{it} \\ + \beta_7 ICT\_exp\_ser_{it} + \beta_8 unemp\_rate_{it} + \gamma_i + \varepsilon_{it} \end{aligned}$$

Where inq_{it} represent Gini coefficient of disposable income (gini_net) and Gini coefficient of market (gini_mkt) in country at time t; $trade_{it}$ is the variable of interest in this model and represented by total export in percentage of GDP in country i at time t; Y_{it} represent the GDP per capita in country i at time t; $tert\_scho\_enrol_{it}$ represent the tertiary school enrolment in percentage of total enrolment in country i at time t; rur_pop_{it} the share of people living in rural area in country i at time t; $\beta_7 ICT\_exp\_go_{it}$ ICT goods exports (% of total goods exports)

[13] ICT: Information and Communication Technology

in country i at time t; $\boldsymbol{\beta_7 ICT\_exp\_ser_{it}}$ ICT services exports (% of total services exports) in country i at time t; $\boldsymbol{unemp\_rate_{it}}$ unemployment rate in country i at time t; $\boldsymbol{\gamma_i}$ represent country fixe effect and $\boldsymbol{\varepsilon_{it}}$ the common error terms.

The table below provide a breve summary about the expected effect of different variables given the sign of parameter β.

Table 2: Summary of expected effect

parameters	Sign / effect
β_1	+ /- (according to empirical findings)
β_2 and β_3	Kuznets effect (increase then decrease income inequality)
β_4	- (reduce income inequality)
β_5	+ (increase income inequality)
β_6	+ (increase income inequality)
β_7	+ (increase income inequality)
β_8	+ (increase income inequality)

Source: Author

All of estimations are run with stata15. Tables are mainly used to present the results of estimation.

4. Empirical analysis

In this section, we present the results of estimation with Gini net income coefficient (4.1) and with Gini market income coefficient for robustness check of the result (4.2).

4.1- Estimation with Gini net income coefficient

In this part we present first the results of estimation with China (table 3) and second without China (table 4) using the Gini net income coefficient (after tax and transfers) as measure of inequality. All interpretations are made ceteris paribus. Recall that, the estimation is run without Mauritania (for regression 3) and without Ghana and Mauritania (for regression 4) because of the lack of data on ICT goods and services export for these countries.

Table 3: Fixe effect regression with China using Gini net coefficient

Estimation with Gini net income coefficient				
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**
Exports_GS	**-0.000396****	**-0.000225**	**-0.000425***	**-0.000342**
	(0.000173)	(0.000182)	(0.000233)	(0.000270)
GDP_per_capita	**8.74e-06****	**1.54e-05*****	**1.77e-05*****	**1.06e-05****
	(3.63e-06)	(4.34e-06)	(4.40e-06)	(4.93e-06)
GDP_PERC_2	**-9.10e-10*****	**-1.14e-09*****	**-1.26e-09*****	**-9.99e-10*****
	(2.11e-10)	(2.25e-10)	(2.33e-10)	(2.66e-10)
tert_Scho_enrol	**0.00146*****	**0.00185*****	**0.00191*****	**0.00169*****
	(0.000435)	(0.000452)	(0.000476)	(0.000523)
rur_pop		**0.00194*****	**0.00214*****	**0.000303**
		(0.000716)	(0.000777)	(0.000881)
ICT_goods_exp			**0.00188*****	**0.00153*****
			(0.000410)	(0.000435)
ICT_serv_exp				**-0.000145**
				(0.000223)
Unemp_rate	**0.00149***	**0.00211****	**0.00173****	**0.00200****
	(0.000847)	(0.000866)	(0.000865)	(0.000965)
Constant	**0.422*****	**0.271*****	**0.252*****	**0.383*****
	(0.00900)	(0.0563)	(0.0604)	(0.0679)
Observations	245	245	224	186
R-squared	0.130	0.159	0.220	0.213
Number of CountryCode	22	22	21	20
Standard errors in parentheses ***** p<0.01, ** p<0.05, * p<0.1**				

Table 3 shows that, even if international trade has an effect on income inequality, for developing countries this effect is small and negative (around 0.0004 reduction point of income inequality).

The sign remains negative for all the regressions we run (1, 2, 3 and 4) even if for some regressions the effect is not statistically significant.

Another result we obtain with our model is the presence of Kuznets effect and this result remains strong by controlling for other variables. Meaning that at the earlier stage of development inequality increase (positive and significant association of GDP per Capita with income inequality) until a certain point of development where inequality start to decrease (negative and significant association of the square of GDP per capita with income inequality).

About the effects of human capital accumulation and unemployment on income inequality, we find that both have a positive impact on income inequality. It means that the increase in the number of people enrolled at university and the increase of the unemployment rate increase income inequality.

Rural population and ICT goods export also are positively associated with income inequality. The increase of rural population by 1 individual increases income inequality by about 0.001 Gini net coefficient point while an increase of ICT goods export in percentage of GDP by one unit of goods increases income inequality by about 0.002 point. The ICT services export has no significant effect on inequality.

Because of the performance of China compared to other developing countries of our sample, we perform again the regression of the model without China to see how variables will behave in this case. The results of different estimations are present in table 4 below. The results are quite similar unless for the unemployment rate for which the effect on income inequality is not statistically significant. International trade reduces income inequality validated by regression 1, 2 and 3. Human capital accumulation and ICT goods export increase inequality. It is also important to notice the presence of a Kuznets effect as suggested by regression 3 in the case of analysis without China.

Table 4: Fixe effect regression without China using Gini net coefficient

Estimation with Gini net income coefficient				
VARIABLES	(1)	(2)	(3)	(4)
Exports_GS	**-0.000500*** **	**-0.000357***	**-0.000453***	**-0.000399**
	(0.000176)	(0.000189)	(0.000243)	(0.000283)
GDP_per_capita	**-1.76e-07**	**5.62e-06**	**1.28e-05** **	**1.55e-06**
	(4.47e-06)	(5.33e-06)	(6.11e-06)	(7.27e-06)
GDP_PERC_2	**-7.72e-10*** **	**-9.46e-10*** **	**-1.19e-09*** **	**-7.71e-10** **
	(2.39e-10)	(2.54e-10)	(2.79e-10)	(3.37e-10)
tert_Scho_enrol	**0.00225*** **	**0.00246*** **	**0.00238*** **	**0.00214*** **
	(0.000531)	(0.000538)	(0.000582)	(0.000627)
rur_pop		**0.00145***	**0.00201** **	**-0.000112**
		(0.000738)	(0.000825)	(0.000962)
ICT_goods_exp			**0.00173*** **	**0.00121** **
			(0.000498)	(0.000528)
ICT_serv_exp				**-0.000132**
				(0.000229)
Unemp_rate	**0.000426**	**0.00106**	**0.00127**	**0.00117**
	(0.000957)	(0.00100)	(0.00104)	(0.00119)
Constant	0.453***	0.338***	0.282***	0.446***
	(0.0114)	(0.0599)	(0.0668)	(0.0793)
Observations	229	229	208	170
R-squared	0.140	0.156	0.185	0.176
Number of CountryCode	21	21	20	19

Standard errors in parentheses
***** p<0.01, ** p<0.05, * p<0.1**

Most of our findings are in line with those found by some authors (such as Bergh and Nilsson, 2010; and Meschi and Vivarelli, 2008**)** in their studies on globalization and inequality. Even if Economics globalization (here measure by international trade) has an effect on income inequality in developing country, this effect is to reduce (suggested by the negative sign) income inequality. Technology measured here by the ICT goods export increases income inequality and this confirms the technology bias inequality. Unemployment rate when China is in the sample increases income inequality. While the regression with a sample without china shows no significant effect of the unemployment rate on inequality. This result has sense because for most of developing country unemployment rate is very low compare to unemployment rate in China. These countries suffer most for the underemployment rate. We could use underemployment rate instead of unemployment rate, but data are not available for most of the countries we chose. This is one of the limits addressed in this research.

A surprising finding is the positive relationship between human capital accumulation and income inequality we find for developing countries. A possible explanation is the fact that an increase in the number of educated people in developing countries may not be large enough to increase the income of the whole population, only increasing the income of a portion of the population will lead to increase inequality.

4.2- Estimation with Gini market coefficient

In order to check whether the previous results are robust, and also check the role of transfer in developing countries, we use a Gini market coefficient (Gini coefficient before tax and transfers). Tables 5 and 6 present respectively the results of an estimation including China of the sample of countries and excluding China of the sample of countries. Here also, we run the estimation without Mauritania (for regression 3) and without Ghana and Mauritania (for regression 4) because of the lack of data on respectively ICT goods and services export.

Table 5: Fixe effect regression with China using Gini market coefficient

Estimation with Gini market income coefficient				
VARIABLES	(1)	(2)	(3)	(4)
Exports_GS	**-0.000729*** **	**-0.000743*** **	**-0.00167*** **	**-0.00198*** **
	(0.000209)	(0.000223)	(0.000279)	(0.000297)
GDP_per_capita	**1.63e-05*** **	**1.57e-05*** **	**1.84e-05*** **	**1.38e-05** **
	(4.36e-06)	(5.31e-06)	(5.26e-06)	(5.42e-06)
GDP_PERC_2	**-1.35e-09*** **	**-1.33e-09*** **	**-1.55e-09*** **	**-1.49e-09*** **
	(2.54e-10)	(2.75e-10)	(2.79e-10)	(2.92e-10)
tert_Scho_enrol	**0.000398**	**0.000366**	**0.00118** **	**0.00122** **
	(0.000524)	(0.000553)	(0.000568)	(0.000576)
rur_pop		**-0.000162**	**0.000797**	**-0.00113**
		(0.000876)	(0.000928)	(0.000968)
ICT_goods_exp			**0.00120** **	**0.00108** **
			(0.000490)	(0.000478)
ICT_serv_exp				**-0.000139**
				(0.000245)
Unemp_rate	**-0.00102**	**-0.00107**	**-0.000228**	**0.000650**
	(0.00102)	(0.00106)	(0.00103)	(0.00106)
Constant	**0.459*** **	**0.472*** **	**0.411*** **	**0.540*** **
	(0.0108)	(0.0689)	(0.0721)	(0.0746)
Observations	245	245	224	186
R-squared	0.194	0.194	0.287	0.373
Number of CountryCode	22	22	21	20
Standard errors in parentheses				
***** p<0.01, ** p<0.05, * p<0.1**				

The analysis of table 5 shows that international trade reduces income inequality before tax and transfers (validate by all regression). We also show the presence of a Kuznets effect. Human capital accumulation and technology also increase income inequality. Nevertheless, unemployment as well as rural population and ICT services exports have no significant effect on income inequality in this case. The extent to which international trade reduces income inequality using the Gini market income coefficient is greater than the effect of international trade using Gini net income coefficient. We could associate this result to policies of redistribution of developing countries. In most of developing countries, institutions are weak and lead to a weak redistribution policy which could increase income inequality.

Table 6: Fixe effect regression without China using Gini market coefficient

	Estimation with Gini market income coefficient			
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**
Exports_GS	**-0.000790*****	**-0.000839*****	**-0.00172*****	**-0.00209*****
	(0.000218)	(0.000236)	(0.000291)	(0.000312)
GDP_per_capita	**1.55e-05*****	**1.35e-05****	**1.41e-05***	**7.22e-06**
	(5.54e-06)	(6.67e-06)	(7.32e-06)	(8.02e-06)
GDP_PERC_2	**-1.32e-09*****	**-1.26e-09*****	**-1.38e-09*****	**-1.16e-09*****
	(2.97e-10)	(3.17e-10)	(3.34e-10)	(3.72e-10)
tert_Scho_enrol	**0.000234**	**0.000161**	**0.00103**	**0.000842**
	(0.000659)	(0.000674)	(0.000697)	(0.000691)
rur_pop		**-0.000502**	**0.000397**	**-0.00174**
		(0.000923)	(0.000988)	(0.00106)
ICT_goods_exp			**0.000805**	**0.000682**
			(0.000597)	(0.000582)
ICT_serv_exp				**-8.34e-05**
				(0.000252)
Unemp_rate	**-0.00150**	**-0.00172**	**-0.000697**	**4.79e-05**
	(0.00119)	(0.00126)	(0.00125)	(0.00131)
Constant	**0.472*****	**0.512*****	**0.461*****	**0.613*****
	(0.0141)	(0.0749)	(0.0801)	(0.0874)
Observations	229	229	208	170
R-squared	0.143	0.144	0.238	0.325
Number of CountryCode	21	21	20	19
Standard errors in parentheses ***** p<0.01, ** p<0.05, * p<0.1**				

The results without China presented in table 6 using Gini market income coefficient are similar for the effect of international trade on income inequality (negative association) and for the presence of Kuznets effect. But, the effect of human capital accumulation is not significant.

5. Conclusion and economics implication

The effect of globalization on income inequality are at the core of a debate among researchers. The objective of this paper is to analyse the impact of economic globalization on income distribution in developing countries. International trade is the main element of economic globalization on which we focus our attention. We first provide a theoretical and empirical study related to the issue of globalization on income inequality. Second, we build an empirical model for analysis of relationship between globalization and income inequality. The measures of inequality used are the Gini net income coefficient and Gini market income coefficient (the later coefficient serve to check the robustness). Also, because of the performance of China compare to other developing countries consider, we run different regression with and without china (this also help to check for the robustness of different results obtained).

The results suggest that, with or without China on the one hand and using Gini net income or Gini market income coefficient on other hand, international trade reduces income inequality in the panel sample of 22 developing countries that we consider (even if the effect is small). The results are in line with those found by Bergh and Nilsson (2010) and Meschi & Vivarelli (2008) in their studies on developing countries. Also, we find the presence of a Kuznets effect. The reduction of income inequality using Gini market income coefficient is greater than the reduction obtained with Gini net income coefficient implying that developing countries have to set up a strong redistribution policy in order to benefit to the effect of international trade on inequality. Other important results that we find concern Human capital accumulation, unemployment rate and technology. Although the increase in the number of educated people in developing countries, this is not sufficient to reduce the income inequality. We therefore suggest more investment in human capital accumulation and a reform of the education system in developing countries.

It is important to notice three limitations of this study for the future investigation. First, we do not consider the source of income of the household. Second our study focusses on developing countries and to control for labour market friction we use unemployment rate instead to underemployment rate. Third, we do not control for institution in our model which is the main issue in developing countries for redistribution policies.

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Appendices

Appendix 1: EFI and KOF index of globalization

Indicators	Definition
EFI index	
EFI 1: Size of government: expenditures, taxes, and enterprises	**A. General government consumption spending as a percentage of total consumption** **B. Transfers and subsidies as a percentage of GDP** **C. Government enterprises and investment as a percentage of GDP** **D. Top marginal tax rate (and income threshold at which it applies**) i. Top marginal income tax rate (and income threshold at which it applies) ii. Top marginal income and payroll tax rate (and income threshold at which it applies)
EFI 2: Legal structure and security of property rights	**A. Judicial independence**: the judiciary is independent and not subject to interference from the government or parties in disputes **B. Impartial courts:** a trusted legal framework exists for private businesses to challenge the legality of government actions or regulation **C. Protection of intellectual property** **D. Military interference in rule of law and the political process** **E. Integrity of the legal system**
EFI 3: Access to sound money	**A. Average annual growth of the money supply in the last five years minus average annual growth of real GDP in the last ten years** **B. Standard inflation variability in the last five years** **C. Recent inflation rate** **D. Freedom to own foreign currency bank accounts domestically and abroad**
EFI 4: Freedom to trade internationally	**A. Taxes on international trade** i. Revenue from taxes on international trade as a percentage of exports plus imports ii. Mean tariff rate iii. Standard deviation of tariff rates **B. Regulatory trade barriers** i. Hidden import barriers: no barriers other than published tariffs and quotas ii. Costs of importing: the combined effect of import tariffs, license fees, bank fees, and the time required for administrative red tape raises costs of importing equipment: by 10% or less=10, by more than 50%=0 **C. Actual size of trade sector compared with expected size** **D. Difference between official exchange rate and black-market rate** **E. International capital market controls** i. Access of citizens to foreign capital markets and foreign access to domestic capital markets ii. Restrictions on the freedom of citizens to engage in capital market exchange with foreigners — index of capital controls among 13 IMF categories

EFI 5: Regulation of credit, labour, and business	**A. Credit market regulations** i. Ownership of banks: percentage of deposits held in privately owned banks ii. Competition: domestic banks face competition from foreign banks iii. Extension of credit: percentage of credit extended to private sector iv. Avoidance of interest rate controls and regulations that lead to negative real interest rates v. Interest rate controls: interest rate controls on bank deposits and/or loans are freely determined by the market **B. Labour market regulations** i. Impact of minimum wage: the minimum wage, set by law, has little impact on wages because it is too low or not obeyed ii. Hiring and firing practices: hiring and firing practices of companies are determined by private contract iii. Share of labour force whose wages are set by centralized collective bargaining iv. Unemployment benefits: the unemployment benefits system preserves the incentive to work v. Use of conscripts to obtain military personnel **C. Business regulations** i. Price controls: extent to which businesses are free to set their own prices ii. Administrative conditions and new businesses: administrative procedures are an important obstacle to starting a new business iii. Time spent dealing with government bureaucracy: senior management spends a substantial amount of time dealing with government bureaucracy iv. Starting a new business: starting a new business is generally easy v. Irregular payments: irregular, additional payments connected with import and export permits, business licenses, exchange controls, tax assessments, police protection, or loan applications are very rare
KOF index of globalization	
KOF 1: Economic globalization	**i)Actual flows** Trade (percent of GDP) Foreign direct investment, flows (percent of GDP) Foreign direct investment, stocks (percent of GDP) Portfolio investment (percent of GDP) Income payments to foreign nationals (percent of GDP) **ii) Restrictions** Hidden import barriers Mean tariff rate Taxes on international trade (percent of current revenue) Capital account restrictions
KOF 2: Social Globalization	**i) Data on personal contacts** Outgoing telephone traffic Transfers (percent of GDP) International tourism Foreign population (percent of total population)

	ii) Data on information flows Internet hosts (per 1000 people) Internet users (per 1000 people) Cable television (per 1000 people) Trade in newspapers (percent of GDP) Radios (per 1000 people) **iii) Data on cultural proximity** Number of McDonald's restaurants (per capita) Number of IKEA outlets (per capita) Trade in books (percent of GDP)
KOF 3: Political globalization	Embassies in country Membership in international organizations Participation in U.N. Security Council missions

Source: Bergh and Nilsson (2010)

Appendix 2: Sample of developing countries studied

N°	Country	Code	Level of development according to World Bank (3yers late up to date)	Accession to WTO
01	Benin	BEN	Low income country	22 February 1996
02	Burkina Faso	BFA	Low income country	3 June 1995
03	Burundi	BDI	Low income country	23 July 1995
04	China	CHN	Low Middle income country	11 December 2001
05	Colombia	COL	Low Middle income country	30 April 1995
06	Côte d'Ivoire	CIV	Low Middle income country	1 January 1995
07	Dominican Republic	DOM	Low Middle income country	9 March1995
08	Gambia	GMB	Low income country	23 October 1996
09	Ghana	GHA	Low Middle income country	1 January 1995
10	Indonesia	IDN	Low Middle income country	1 January 1995
11	Kenya	KEN	Low Middle income country	1 January 1995
12	Malawi	MWI	Low Income country	31 May 1995
13	Mauritania	MRT	Low Middle income country	31 May 1995
14	Morocco	MAR	Low Middle income country	1 January 1995
15	Mozambique	MOZ	Low income country	26 August 1995
16	Niger	NER	Low income country	13 December 1996
17	Peru	PER	Low Middle income country	1 January 1995
18	Philippines	PHL	Low Middle income country	1 January 1995
19	Rwanda	RWA	Low income country	22 May 1996
20	Tanzania	TZA	Low income country	1 January 1995
21	Uganda	UGA	Low income country	1 January 1995
22	Zambia	ZMB	Low Middle income country	1 January 1995

Source: authors using information's from world Bank and WTO web site

Appendix 3: model specification tests

- Likelihood ratio test

```
Fixed-effects (within) regression               Number of obs      =       186
Group variable: CountryCode                     Number of groups   =        20

R-sq:                                           Obs per group:
     within  = 0.2133                                         min =         2
     between = 0.0152                                         avg =       9.3
     overall = 0.0271                                         max =        16

                                                F(8,158)           =      5.35
corr(u_i, Xb)  = -0.7238                        Prob > F           =    0.0000
```

gini_net	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
Exports_GS	-.0003425	.0002697	-1.27	0.206	-.0008751	.0001902
GDP_per_capita	.0000106	4.93e-06	2.15	0.033	8.80e-07	.0000204
GDP_PERC_2	-9.99e-10	2.66e-10	-3.76	0.000	-1.52e-09	-4.74e-10
tert_Scho_enrol	.0016897	.0005235	3.23	0.002	.0006558	.0027237
rur_pop	.0003034	.0008806	0.34	0.731	-.0014359	.0020426
ICT_goods_exp	.0015344	.0004345	3.53	0.001	.0006762	.0023927
ICT_serv_exp	-.0001449	.0002229	-0.65	0.517	-.0005851	.0002954
Unemp_rate	.0019967	.0009651	2.07	0.040	.0000905	.0039029
_cons	.3832409	.0679001	5.64	0.000	.2491319	.5173499
sigma_u	.05382531					
sigma_e	.01231149					
rho	.95028338	(fraction of variance due to u_i)				

```
F test that all u_i=0: F(19, 158) = 54.01                     Prob > F = 0.0000
```

- Breusch Pagan test

```
Breusch and Pagan Lagrangian multiplier test for random effects

        gini_net[CountryCode,t] = Xb + u[CountryCode] + e[CountryCode,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+------------------------------
                gini_net |    .0014743        .0383965
                       e |    .0001516        .0123115
                       u |     .001543        .0392806

        Test:   Var(u) = 0
                                 chibar2(01) =   347.87
                              Prob > chibar2 =   0.0000
```

- **Hausman test**

	Coefficients (b) eq	(B) .	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
Exports_GS	-.0003425	-.0000925	-.00025	.0000484
GDP_per_ca~a	.0000106	6.40e-06	4.23e-06	2.01e-06
GDP_PERC_2	-9.99e-10	-7.21e-10	-2.78e-10	8.94e-11
tert_Scho_~l	.0016897	.0013548	.0003349	.0001073
rur_pop	.0003034	.0001062	.0001972	.0006422
ICT_goods_~p	.0015344	.0008481	.0006863	.0001583
ICT_serv_exp	-.0001449	-.0001552	.0000104	.
Unemp_rate	.0019967	.0019709	.0000258	.0000567

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 14.21
Prob>chi2 = 0.0476
(V_b-V_B is not positive definite)